AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-62 (Cancelled)

Claim 63 (Currently Amended) A data acquisition system for gathering geophysical data, said system comprising:

at least one data acquisition unit connectable to a plurality of sensors and being arranged, during use, to simultaneously gather geophysical data from the sensors, the at least one data acquisition unit comprising time referencing means arranged to generate time reference data usable to control the time at which samples of geophysical data are taken; and

means for calculating spatial derivatives between simultaneous samples associated with adjacent sensors that are connected, during use, to the at least one data acquisition unit.

Claim 64 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the time referencing means comprises a GPS receiver.

Claim 65 (Previously Presented) The data acquisition system as claimed in claim

63, wherein the time referencing means comprises an accurate oscillator.

Claim 66 (Previously Presented) The data acquisition system as claimed in claim 65, wherein the accurate oscillator comprises a precision oven controlled crystal oscillator, and the time referencing means further comprises a counter arranged to count signals generated by the crystal oscillator.

Claim 67 (Previously Presented) The data acquisition system as claimed in claim 65, wherein the data acquisition unit is arranged to receive synchronisation signals useable to adjust a frequency of the oscillator and thereby adjust the times at which samples of geophysical data are taken so that the times at which samples of geophysical data are taken are synchronised with the times at which samples of geophysical data are taken in other data acquisition units.

Claim 68 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to receive and store programs for subsequent execution.

Claim 69 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to calculate an average sample value for a plurality of corresponding repeat sample values when a plurality of data gathering operations are carried out as part of a geophysical survey so as to reduce an effect of interference on the samples and reduce the quantity of data.

Claim 70 (Previously Presented) The data acquisition system as claimed in claim 69, wherein the data acquisition unit is arranged to compare repeat samples and to discard samples which differ by a predetermined amount from a majority of the repeat samples.

Claim 71 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to calculate an average sample value for a plurality of consecutive samples taken during a data gathering operation carried out as part of a geophysical survey so as to produce a representative sample for the consecutive samples.

Claim 72 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to estimate the amount of interference present at a survey site.

Claim 73 (Previously Presented) The data acquisition system as claimed in claim 72, wherein the amount of interference present is estimated by carrying out a first data gathering operation with an incident magnetic field of a first polarity so as to produce a first response, carrying out a second data gathering operation with an incident magnetic field of a second polarity so as to produce a second response, and calculating a sum of the first and second responses so as to cause the first and second responses to cancel out.

Claim 74 (Previously Presented) The data acquisition system as claimed in claim

63, wherein the data acquisition unit is arranged to filter gathered geophysical data so as to remove periodic interference.

Claim 75 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to convert gathered geophysical data into frequency domain using Fourier transform analysis.

Claim 76 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to generate at least one quality control indicator for use in assessing a quality of the gathered geophysical survey data.

Claim 77 (Previously Presented) The data acquisition system as claimed in claim 76, wherein the data acquisition unit is arranged to calculate a standard deviation value for the gathered geophysical survey data.

Claim 78 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to adjust a level of gain applied to gathered geophysical survey data based on an assessment of a magnitude of the gathered geophysical survey data.

Claim 79 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to downward extrapolate gathered geophysical survey data so as to enhance detail of a target located below a surface

of a survey area.

Claim 80 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is connectable to an energy source, the data acquisition unit is arranged to gather energy source output data from the energy source, and the time referencing means is arranged so as to sample the gathered energy source output data.

Claim 81 (Previously Presented) The data acquisition system as claimed in claim 80, wherein the system is arranged to correct for variations in magnitude of the energy source output during a geophysical survey.

Claim 82 (Previously Presented) The data acquisition system as claimed in claim 76, wherein the system is arranged to correct for a variation in magnitude of the gathered geophysical data caused by a variation in power supplied to the energy source.

Claim 83 (Previously Presented) The data acquisition system as claimed in claim 63, further comprising at least one interface arranged to facilitate transfer of geophysical data and/or programs to or from the data acquisition unit.

Claim 84 (Previously Presented) The data acquisition system as claimed in claim 83, wherein the data acquisition unit comprises a multi-tasking operating system.

Claim 85 (Previously Presented) The data acquisition system as claimed in claim 84, wherein the data acquisition unit is arranged to facilitate transfer of geophysical data from the data acquisition unit during a geophysical survey.

Claim 86 (Previously Presented) The data acquisition system as claimed in claim 83, wherein the interface comprises at least one of an infra red interface, a serial interface, and a network interface.

Claim 87 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit is arranged to store a correction coefficient for each sensor connected during use to the data acquisition unit, each correction coefficient being used to correct for variations in sensor sensitivity.

Claim 88 (Previously Presented) The data acquisition system as claimed in claim 63, further comprising display means arranged to provide information indicative of operation of the data acquisition unit to an operator.

Claim 89 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the data acquisition unit includes the means for calculating spatial derivatives.

Claim 90 (Previously Presented) The data acquisition system as claimed in claim 63, wherein the means for calculating spatial derivatives is separate from the data acquisition unit.

Claim 91 (Previously Presented) The data acquisition system as claimed in claim 90, further including a portable computing device, the portable computing device including the means for calculating spatial derivatives.

Claim 92 (Previously Presented) The data acquisition system as claimed in claim 63, comprising a plurality of data acquisition units.

Claim 93 (Previously Presented) The data acquisition system as claimed in claim 63, further comprising:

at least one reference data acquisition unit, each reference data acquisition unit being connectable to at least one reference sensor and being arranged, during use, to gather geophysical data from the at least one reference sensor, and to take samples of the geophysical data gathered from the at least one reference sensor;

wherein the means for calculating spatial derivatives between samples associated with adjacent sensors is arranged to calculate first spatial derivatives between at least some of the sensors and the at least one reference sensor connected to the reference data acquisition unit during a first data gathering operation when the sensors are disposed in a first location, to calculate second spatial derivatives between at least some of the sensors and the at least one reference sensor connected to the reference data acquisition unit during a second data gathering operation when the sensors are disposed in a second location, and to calculate a difference spatial derivative between the first and second spatial derivatives, each said difference spatial derivative being indicative of a spatial

derivative between a sensor disposed in a first location and a sensor disposed in a second location.

Claim 94 (Previously Presented) The data acquisition system as claimed in claim 93, further comprising means for calculating an integral of the spatial derivatives.

Claim 95 (Previously Presented) The data acquisition system as claimed in claim 93, further comprising an energy source arranged to generate and direct energy towards a sub-surface volume so as to cause a geophysical response and thereby cause generation of the geophysical signals.

Claim 96 (Previously Presented) The data acquisition system as claimed in claim 95, wherein the energy source includes a transmitter and a transmitter loop.

Claim 97 (Previously Presented) The data acquisition system as claimed in claim 93, further comprising an energy source control unit connectable to the energy source and arranged to gather output data from the energy source, the energy source control unit comprising time referencing means arranged to generate time reference data usable to control the time at which samples of the energy source output data are taken and to associate the energy source output data with the time reference data.

Claim 98 (Previously Presented) The data acquisition system as claimed in claim 97, wherein the energy source control unit is a transmitter control unit arranged to

control a transmitter so as to energise a transmitter loop in accordance with a predetermined frequency.

Claim 99 (Previously Presented) The data acquisition system as claimed in claim 97, wherein the energy source control unit includes the same components as the data acquisition unit so that the transmitter control unit is capable of carrying out the functions of the data acquisition unit and vice versa.

Claim 100 (Currently Amended) A method of acquiring geophysical data, said method including the steps of:

providing at least one data acquisition unit arranged to simultaneously gather geophysical data from a plurality of sensors connected in use to the at least one data acquisition unit;

connecting a plurality of sensors to the at least one data acquisition unit;

generating at the data acquisition unit time reference data usable to control the time at which gathering of samples of geophysical data are taken; and

calculating spatial derivatives between simultaneous samples associated with adjacent sensors that are connected, during use, to the at least one data acquisition unit.

Claim 101 (Currently Amended) The method of acquiring geophysical data as claimed in claim 100, further comprising the steps of:

providing at least one reference data acquisition unit arranged, during use, to gather geophysical data from at least one reference sensor;

connecting each of the at least one reference data acquisition unit to at least one of the at least one reference sensors;

calculating first spatial derivatives between at least some of the sensors connected to the data acquisition units and the at least one reference sensor connected to the at least one reference data acquisition unit during a first data gathering operation when the sensors are disposed in a first location;

calculating second spatial derivatives between at least some of the sensors connected to the data acquisition units and the at least one reference sensor connected to the at least one reference data acquisition unit during a second data gathering operation when the sensors are disposed in a second location; and

calculating a difference spatial derivative between the first and second spatial derivatives, each said difference spatial derivative being indicative of a spatial derivative between the first location and ~~a sensor~~ the second location.

Claim 102 (Previously Presented) The method as claimed in claim 100, further comprising means for calculating an integral of the spatial derivatives.

Claim 103 (Previously Presented) The method as claimed in claim 100, wherein the step of generating time reference data comprises the step of providing a GPS receiver.

Claim 104 (Previously Presented) The method as claimed in claim 100, wherein the step of generating time reference data comprises the step of providing an oscillator.

Claim 105 (Previously Presented) The method as claimed in claim 104, wherein the oscillator comprises a precision oven controlled crystal oscillator, and the step of generating time reference data further comprises the step of providing a counter arranged to count signals generated by the crystal oscillator.

Claim 106 (Previously Presented) The method as claimed in claim 104, further comprising the step of facilitating reception at the data acquisition unit of synchronisation signals useable by the processing means to adjust a frequency of the oscillator and thereby adjust the time at which samples of geophysical data are taken so as to synchronise the time at which samples of geophysical data are taken with the time at which samples of geophysical data are taken in other data acquisition units.

Claim 107 (Previously Presented) The method as claimed in claim 100, further comprising the steps of receiving and storing programs at the data acquisition unit for subsequent execution by the processing means.

Claim 108 (Previously Presented) The method as claimed in claim 100, further comprising the step of calculating an average sample value for a plurality of corresponding repeat sample values when a plurality of data gathering operations are carried out as part of a geophysical survey so as to reduce an effect of interference on the samples and reduce the quantity of data.

Claim 109 (Previously Presented) The method as claimed in claim 100, further

comprising the step of comparing repeat sample values and discarding samples which differ by a predetermined amount from a majority of the repeat sample values.

Claim 110 (Previously Presented) The method as claimed in claim 100, further comprising the step of calculating an average sample value for a plurality of consecutive samples taken during a data gathering operation carried out as part of a geophysical survey so as to produce a representative sample for the consecutive samples.

Claim 111 (Previously Presented) The method as claimed in claim 100, further comprising the step of estimating the amount of interference present at a survey site.

Claim 112 (Previously Presented) The method as claimed in claim 111, wherein the amount of interference present is estimated by carrying out a first data gathering operation with an incident magnetic field of a first polarity so as to produce a first response, carrying out a second data gathering operation with an incident magnetic field of a second polarity so as to produce a second response, and calculating the sum of the first and second responses so as to cause the first and second responses to cancel out.

Claim 113 (Previously Presented) The method as claimed in claim 100, further comprising the step of filtering gathered geophysical data so as to remove periodic interference.

Claim 114 (Previously Presented) The method as claimed in claim 100, further comprising the step of converting gathered geophysical data into frequency domain using Fourier transform analysis.

Claim 115 (Previously Presented) The method as claimed in claim 100, further comprising the step of correcting for variations in magnitude of an energy source during a geophysical survey.

Claim 116 (Previously Presented) The method as claimed in claim 115, wherein the step of correcting for variations in magnitude includes the step of correcting for a variation in magnitude of the energy source caused by a variation in power supplied to the energy source.

Claim 117 (Previously Presented) The method as claimed in claim 100, further comprising the step of generating at least one quality control indicator for use in assessing the quality of the gathered geophysical survey data.

Claim 118 (Previously Presented) The method as claimed in claim 117, further comprising the step of calculating a standard deviation value for the gathered geophysical survey data.

Claim 119 (Previously Presented) The method as claimed in claim 100, further comprising the step of adjusting a level of gain applied to gathered geophysical

survey data based on an assessment of the magnitude of the gathered geophysical survey data.

Claim 120 (Previously Presented) The method as claimed in claim 100, further comprising the step of downward extrapolating gathered geophysical survey data so as to enhance detail of a target located below a surface of a survey area.

Claim 121 (Previously Presented) The method as claimed in claim 100, wherein the method further comprises the step of facilitating transfer of processed geophysical data and/or programs to or from the data acquisition unit.

Claim 122 (Previously Presented) The method as claimed in claim 100, further comprising the step of providing each data acquisition unit with display means for providing information indicative of operation of the data acquisition unit to an operator.

Claim 123 (Previously Presented) The system as claimed in claim 95, wherein the system is arranged to correct variations in the energy source using the reference data acquisition unit and associated reference sensor.

Claim 124 (Previously Presented) The method as claimed in claim 115, further comprising the step of correcting variations in the energy source using the reference data acquisition unit and associated reference sensor.

Claim 125 (Currently Amended) A data acquisition system for gathering geophysical data, said system comprising:

at least one data acquisition unit connectable to a plurality of sensors and being arranged, during use, to simultaneously gather geophysical data from the sensors, the at least one data acquisition unit comprising time referencing means arranged to generate time reference data usable to control a time at which samples of geophysical data are taken; and

a processor arranged to calculate spatial derivatives between simultaneous samples associated with adjacent sensors that are connected, during use, to the at least one data acquisition unit.